

STRAIN-SPECIFIC VIRULENCE OF *BORDETELLA HINZII* IN POULTRY

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Study Results

The results of this study demonstrate that some strains of *Bordetella hinzii* are virulent in turkey poults and may asymptotically colonize chicks and suggest this agent may be of concern to poultry producers.

Significance of Study Results

The goals of this study were to determine whether *B. hinzii* strains representing a diversity of genetic backgrounds and originating from a variety of hosts and geographic regions differ in their ability to colonize and cause disease in turkeys and chickens. The antibody response to infection and histopathological changes in the tracheas of infected birds were also compared. In this study, 6 strains of *B. hinzii*, genetically distinct and representing all known host species, were evaluated for their ability to colonize and cause disease in turkeys following intranasal administration. While five strains were able to colonize the tracheas of turkey poults, only a subset induced clinical signs of disease, *B. hinzii*-specific antibodies or tracheal lesions. The sixth isolate was undetectable in tracheal swabs obtained 1 or 2 weeks post-infection (Figure 1).

Additional Information

Two species of *Bordetella*, *B. avium* and *B. hinzii*, are known to commonly infect avian hosts. *B. avium* is the etiologic agent of turkey coryza, a disease of high morbidity characterized by snickering, mouth breathing, dyspnea, and discharge from the eyes and nares. *B. hinzii*, referred to as *B. avium*-like or as *Alcaligeis faecalis* type II prior to

1995, is commonly isolated from the respiratory tracts of diseased poultry but has not been demonstrated to be pathogenic in either chickens or turkeys. Phenotypic methods for distinguishing between *B. avium* and *B. hinzii* do not reliably identify all strains and results may vary depending on inoculum size and culture conditions. More recently developed nucleic acid-based methods clearly distinguish between these species and are highly reproducible.

Although it is generally accepted that *B. hinzii* is nonpathogenic in poultry, no systematic evaluation using genetically distinct strains (e.g., strains of different REA types or ribotypes) has been reported. Recently, it was discovered that a number of avian isolates identified at the time of their acquisition as *B. avium*, *B. avium*-like or *Alcaligenes faecalis* type II, are more properly classified as *B. hinzii*. Included in this group are several isolates that had been reported to cause 100% morbidity in turkey poults, with a severity indistinguishable from that of *B. avium*. Accordingly, the capacity of *B. hinzii* to cause disease in poultry seems uncertain and should be more rigorously examined.

The failure of any strain evaluated here to induce disease in chickens, consistent with prior efforts of others, suggests *B. hinzii* may not be pathogenic in that avian host. This is, perhaps, not surprising, considering that the only other *Bordetella* species known to cause disease in turkeys, *B. avium*, has only rarely been reported as a primary pathogen in chickens. However, prior isolation of *B. hinzii* from chickens, as well as the data reported here, clearly establishes that at least some strains are able to colonize this host. The true prevalence of *B. hinzii* in chickens, and the specific bacterial and/or host characteristics which permit colonization, are unknown. Also unknown is the potential for increased susceptibility to other agents, as discussed above.

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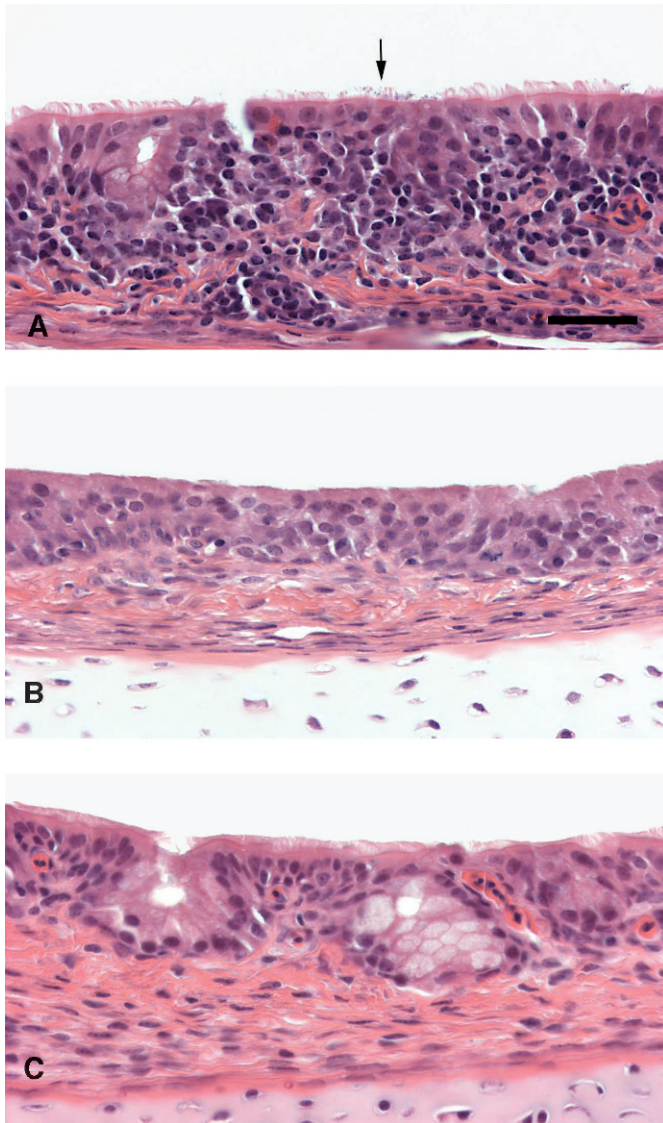


Fig. 1. Five-micrometer sections of tracheas from turkey poult infected with *B. hinzii* strain F1 (A and B) or strain 4161 (C) stained with hematoxylin and eosin. (A) The mucosa is expanded by lymphoplasmacytic infiltrates, which obscure or replace mucous glands. Cilia-associated bacteria colonizing the epithelium are apparent (arrow). (B) Epithelial dysplasia is evidenced by loss of ciliated epithelium and mucous glands, cuboidal metaplasia with loss of polarity and stacking of epithelial cells. (C) The mucosa appears healthy, non-inflamed, and is lined by ciliated pseudostratified columnar epithelium and a normal complement of mucus-filled mucous glands. There is no evidence of bacterial colonization. Bar = 50 μ m.